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Psychosocial adjustment to mild cognitive impairment

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Psychosocial adjustment to Mild Cognitive Impairment: the role of illness perceptions, cognitive fusion and cognitive impairment.

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Conflicts of Interest

We have no conflicts of interest to declare.

Abstract

Background and Objective:

Receiving a Mild Cognitive Impairment (MCI) diagnosis and adjusting to this condition is challenging, given the uncertain clinical trajectory surrounding progression to dementia. We aimed to explore the influence of illness perceptions and cognitive fusion on coping and emotional responses in a sample of people diagnosed with MCI.

Research Design & Method: A cross-sectional study of 34 participants with MCI (47% female and 53% male, mean age 76.4 years) evaluated the relationships between cognitive impairment, illness perceptions and cognitive fusion on levels of distress and quality of life (QoL). Participants completed standardised measures for cognitive assessment, illness perceptions, cognitive fusion, depression, anxiety and QoL. Relationships between variables were analysed using correlation, regression and conditional process analyses.

Results: At the group level, illness perceptions were found to be a stronger predictor of depression and QoL in the current sample than objective cognitive impairment. Illness perceptions did not directly predict anxiety, rather cognitive fusion significantly mediated this relationship. Cognitive fusion also significantly mediated the relationship between illness perceptions and depression. Illness perceptions had a significant, direct effect on QoL, however there was no significant indirect effect via cognitive fusion. Greater fusion with threatening illness perceptions was significantly related to increased anxiety and depression.

Discussion & Implications: Data suggest multiple potential treatment targets in helping people diagnosed with MCI to successfully adapt and adjust. Targeting appraisals (illness perceptions) using Cognitive Therapy is one potential treatment target. In addition, psychological treatments such as Acceptance and Commitment Therapy (ACT), which target cognitive fusion, could also warrant further investigation in this population, due to the significant indirect paths from illness perceptions to distress and QoL, via cognitive fusion.

Keywords: Mild Cognitive Impairment; Acceptance and Commitment Therapy; Illness Perceptions

BACKGROUND

Receiving a Mild Cognitive Impairment (MCI) diagnosis can evoke a broad range of emotional responses in people diagnosed with MCI including worry, ambivalence or relief (Dean & Wilcock, 2012; Gomersall et al. 2015). MCI is a vague term and makes the person confused as to whether they will go on to develop dementia or not (Corner and Bond, 2006). Some researchers argue that an MCI diagnosis merely causes undue distress for individuals and their caregivers about what may be part of a 'normal' ageing process (Beard & Neary, 2013; Fang et al., 2017; Whitehouse, 2007). Limited research has focused on individual experiences of receiving this diagnosis.

Data from population studies, adopting Petersen's expanded definition of MCI, indicate that approximately 18% of older adults have MCI, with incidence rates of 47.9 (range: 21.5-71.3) per 1000 person-years (Petersen et al., 2014). People diagnosed with MCI are at increased risk of developing dementia, particularly Alzheimer's disease. Research evidence from a large meta-analysis of 41 studies suggests that annual progression rates are around 5% to 10% (Mitchell & Shiri-Feshki, 2009), however many people diagnosed with MCI experience no further cognitive decline and an estimated 16% revert back to 'normal' cognitive functioning (Koepsell & Monsell, 2012; Sachdev et al., 2013). It should be noted that conversion rates vary widely between studies due to differences in study sampling procedures (e.g. memory clinics or community based studies) and variation in the operationalization and implementation of diagnostic criteria across settings.

A meta-analysis found that anxiety and depression symptoms significantly increase risk of progression from MCI to dementia by around 18% and 25% respectively (Mourao, Mansur, Malloy-Diniz, Castro-Costa & Diniz, 2016; Li & Li, 2018). Variations in how people adjust psychologically to MCI could be influenced by individual beliefs or perceptions about the diagnosis. The Common Sense Model (CSM) of Self-Regulation (Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984) offers a theoretical framework to explain diversity in individual responses to ill health and proposes that 'illness perceptions' can have a direct effect on coping behaviour and emotional wellbeing. Illness perceptions are appraisals or cognitions that form in response to a health-related threat and include: beliefs about how long the illness will last, what the consequences will be, how controllable the symptoms are via self-management or formal treatment and what the possible causes are. The CSM has an extensive evidence-base across a range of health conditions including multiple

sclerosis (Dennison, Moss-Morris & Chalder, 2009); chronic pain (Gillanders, Ferreira, Bose, & Esrich (2013); diabetes (Hudson, Bundy, Coventry & Dickens, 2014); and cardiovascular conditions (Foxwell, Morley & Frizelle, 2013). A study exploring the relationship between illness perceptions and coping behaviour in older adults with MCI (n= 63) found significant associations between perceptions of MCI, self-reported symptoms and coping (Lin and Heidrich, 2012). A similar study (Lin, Gleason and Heidrich, 2012) with well-educated males who had been diagnosed with MCI (n= 30) found no significant association between illness perceptions and distress. This study was limited by a small homogeneous sample, who received the diagnosis two years prior to taking part in the study; thus, potentially not capturing the adjustment period following diagnosis. Stevenson (2014) provided some evidence to support the CSM with an older adult MCI population (n=19). Perceptions regarding the consequences and emotional impact of MCI were associated with increased anxiety symptoms. No association was found between perceptions of MCI and quality of life (QoL) in their sample. Overall, it was considered that the sample population was generally well-adjusted. In addition, the study was considered to have insufficient statistical power for the comparisons reported due to low sample size, which may account for the lack of association.

There has only been one study to date investigating the effectiveness of a CBT group intervention for people diagnosed with MCI (Banningh et al., 2011). Authors compared the CBT intervention to a wait list control, on outcome measures of distress, well-being and illness appraisals in the form of the Illness Cognition Questionnaire (ICQ; Evers et al., 2001). Results showed that participants improved in adaptive appraisals after receiving CBT ($p = 0.034$) compared to the waiting list period. In contrast, distress ($p = 0.34$) and general well-being ($p = 0.78$) did not improve. This calls into question whether the primary mechanism of action of CBT (modification of maladaptive appraisals) is in fact strongly linked to outcomes such as distress and quality of life, in people diagnosed with MCI.

Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl & Wilson, 1999; 2012) is a well-developed framework, describing processes involved in adjustment to health conditions. See Graham, Gouick, Krahé & Gillanders, (2016), for a systematic review of ACT for long term health conditions. ACT differs from CBT as it focuses on the 'function' rather than the 'content' of inner experiences, the ACT model proposes that how one *relates* to internal experiences (e.g. symptoms and their appraisal), independent of content or form, is also an important influence on outcomes such as

distress, wellbeing and behaviour. In ACT, this relationship that a person has with their thoughts and beliefs is referred to as cognitive fusion or defusion (Gillanders et al., 2014a). Cognitive defusion is the ability to step back and take a more detached perspective on thoughts, seeing them as mental events rather than facts. In contrast, cognitive fusion is the tendency for thoughts to be taken literally, and behaviour to be overly regulated and influenced by thoughts and beliefs. When 'fused', a person acts on thoughts as if these were true, and thoughts and beliefs come to dominate behaviour and experience over other sources of behavioural regulation (Gillanders et al., 2014a).

Studies indicate that cognitive fusion is a significant predictor of psychological distress and QoL in a range of health conditions including multiple sclerosis (Ferenbach, 2011), chronic pain (McCracken & Vowles, 2014) and cancer (Gillanders et al., 2015). To date, there have been no studies investigating the role of cognitive fusion in adjustment to MCI. The aim of this study is to investigate the influence of illness perceptions and cognitive impairment on levels of distress and QoL in people who were diagnosed with MCI approximately three to nine months previously, and to examine whether cognitive fusion has a mediating role in relationships between predictor (illness perceptions and cognitive impairment) and outcome variables (anxiety, depression and QoL) in people diagnosed with MCI.

RESEARCH DESIGN & METHODS

The study was cross-sectional. Standardised questionnaires were used to measure cognitive impairment, appraisals of MCI, cognitive fusion, anxiety, depression and QoL. A group of older adults registered with the Patient and Public Advisory Service were involved in the design of the study.

Participants & Procedure

Power calculations were carried out *a-priori*, G*power (version 3.1) (Faul, Erdfelder, Buchner & Lang, 2009) was used to calculate sample size estimates for correlation analysis to detect medium and large effect sizes, with a power of 0.80 and an alpha of <0.05. Estimates were n=67 to detect medium effects, Fritz and Mackinnon (2007) suggest a sample size of 54 to detect medium-sized indirect effects.

Participant inclusion criteria included: 1) diagnosis of MCI according to ICD-10 criteria (World Health Organisation, 1992) in the last three to nine months; 2) aged sixty years or over; 3) fluent in writing and reading English; 4) capacity to consent to taking part. Participants were excluded if: 1) resided in a care home; 2) had a significant physical or mental health problem (e.g. Parkinson's disease or schizophrenia); 3) significant

sensory impairment, a history of pre-morbid cognitive difficulties, stroke or brain injury, and past or present substance misuse; 4) score on the Montreal Cognitive Assessment (MoCA; Nasreddine et al. 2005) below the threshold for MCI (<18), suggestive of greater cognitive impairment (Freitas, Simões, Alves & Santana, 2013). Participants were recruited from XX and XX between March 2017 and February 2018. Participants were either identified directly by an XX clinician (Consultant Psychiatrist or Clinical Psychologist) involved in the assessment of their memory difficulties, or indirectly identified following a case-note review of former memory clinic attendee notes, which was carried out by the first author (XX). All participants provided informed consent prior to commencement of the study.

Measurements

1. Demographic questionnaire: including age; gender; marital status; educational attainment (years); length of time since diagnosis; onset of cognitive difficulties (months); previous or current occupation; and age at retirement, if applicable.

2. Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005) a cognitive screening tool assessing several domains of cognition including: memory; language skills; visuospatial abilities; and executive functioning. Validation studies suggest that the MoCA has high test-retest reliability, good internal consistency (Cronbach's $\alpha = 0.83$) and adequate levels of sensitivity (90%) and specificity (87%) for detecting MCI. The maximum MoCA score is 30 and scores between 26 and 18 are clinically indicative of MCI.

3. Geriatric Depression Scale – 5 (Hoyl et al., 1999) a five item, self-report measure of depression intended for use with older adults (aged 60+). It has been successfully administered to people diagnosed with MCI in previous studies (Lin, Gleason & Heidrich, 2012; Stevenson et al. 2014). A score greater than two out of five is indicative of clinical levels of depression (Hoyl et al., 1999).

4. Geriatric Anxiety Inventory – Short Form (GAI-SF; Byrne & Pachana, 2011) a five item, self-report measure of anxiety intended for use with older adults (aged 60+). The GAI-SF has been shown to have adequate sensitivity (.75) and internal consistency (Cronbach's $\alpha=0.71$), and good specificity (.87) in a community-dwelling older adult sample (Byrne & Pachana, 2011; Johnco, Knight, Tadic & Wuthrich, 2015). A score greater than three out of five is indicative of clinical levels of anxiety.

5. Illness Perception Questionnaires – Mild Cognitive Impairment (IPQ-MCI; Lin et al., 2012) a measure of illness perceptions intended for use with groups of people diagnosed with MCI. It is based on the Illness Perception Questionnaire-Revised (IPQ-R; Moss-Morris et al. 2002), which is a broad-based measure of illness perceptions

that can be used across a range of health conditions. The IPQ-MCI has nine subscales: identity; cause; consequences; chronic timeline; cyclic; personal control; treatment control; coherence; and emotional representation. The cause subscale was omitted in this study to reduce respondent burden and because the qualitative interpretation required for this item did not fit with the planned analyses. The IPQ-MCI has been validated with an MCI population and demonstrates adequate internal consistency (Cronbach's α ranging from .62 to .86) (Lin et al., 2012; Lin & Heidrich, 2012).

6. Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014) a seven item, self-report questionnaire measuring cognitive fusion. The CFQ has demonstrated adequate internal consistency in an older adult population with chronic pain (Cronbach's $\alpha=.74$) (Scott, Daly, Yu, & McCracken et al. 2017). The CFQ has not been validated with people diagnosed with MCI, however research has demonstrated cognitive fusion, as measured by the CFQ, to be a good predictor of anxiety, depression and QoL in people with other neurological conditions including multiple sclerosis (Gillanders et al. 2014; Valvano et al. 2016) and health conditions such as cancer (Gillanders et al. 2015).

7. Quality of Life in Alzheimer's Disease (QoL-AD; Logsdon, Gibbons, McCurry & Teri, 2002) a 13 item, self-report measure designed specifically to assess QoL in people with Alzheimer's disease. Although the measure was developed for individuals with Alzheimer's disease, rather than MCI, it was selected for use in the current study as it incorporates a memory item and has a simple format deemed potentially less challenging for individuals with compromised cognition. The QoL-AD has demonstrated good concurrent validity and internal reliability (Cronbach's $\alpha=.90$) when administered to individuals diagnosed with MCI (Tatsumi, Yamamoto, Nakaaki, Hadano & Narumoto, 2011).

Data analysis

All variables met the assumption of normality, except for GAI-SF, GDS-5 and IPQ-MCI subscales: chronic timeline and treatment control. Transformations (square root and logarithmic) were conducted and resulted in a marked improvement in normality. There were no violations of linearity, homoscedasticity or multi-collinearity. Presence of outliers was assessed visually using histograms and statistically using the Mahalanobis distance statistic. No significant outliers were identified. Little's missing completely at random (MCAR) test was employed to test if the pattern of missing data significantly differed from random. Results indicated that data were not missing at random. Non-random missing data were identified for the 'marriage' item on the QoL-AD measure, due to a proportion of participants being single or widowed ($n=10$). A total adjusted QoL-AD score was calculated, omitting the 'marriage' item. Bivariate

correlations were used to initially explore relationships between all variables. A simultaneous forced entry method of regression was selected to analyse the relative contribution of the independent predictor variables (threat appraisals and cognitive impairment) on anxiety, depression and QoL outcome variables. The bootstrapping method of simple mediation analysis (Hayes, 2013) was selected for conditional process analyses, as opposed to The Sobel Test (Sobel, 1982) or the Baron and Kenny (1986) approach, as it is considered to be a robust method of analysis in circumstances where sample size is small (Fritz and MacKinnon, 2007; MacKinnon et al. 2002). All statistical analyses were conducted using IBM Statistical Package for Social Science (SPSS) version 24 (IBM, 2016). The PROCESS macro for SPSS developed by Hayes (2013) was used to conduct simple mediation analyses (model 4) using 5000 bootstrap resamples.

Ethics

Ethical approval was granted from XXX Ethics Committee (reference: 16/SS/0215), XX and XXX (reference: 2016/0320 and L17015) and XXX

RESULTS

Ninety participants were identified as eligible following case-note review and 26 returned opt-in slips, equating to a return rate of 29%. XX clinicians identified 33 eligible participants and 15 returned opt-in slips. A total of 41 participants were recruited and only 34 completed the study: one was excluded owing to significant physical health problems; two no longer fulfilled the eligibility criteria; three had administrative issues and one dropped out. Of the 34 participants included in the study, 47% were female and 53% were male, mean age of participants was 76.4 years (range 62-90), 82% of participants were retired, 68% were married, 21% widowed, 9% single and 3% divorced, years in education across the sample was 14.3 years ($SD=3.7$). Time since onset of cognitive problems varied across the sample: 11.8% reported onset within the last year; 38.3% within the last one to three years, 32.3% within the last three to five years; and 17.6% reported onset of problems more than five years ago. The mean MoCA score was 21.9, all participants were diagnosed with MCI in the past three to nine months ($M=5.3$, $SD=2.2$). See Table 1 for participants' demographics.

- Insert Table 1 here -

Distress and quality of life

Participants scored, on average, slightly higher for anxiety ($M=1.8$, range 0-5) than depression ($M=1.1$, range 0-5). Across the sample, 21% were experiencing clinical levels of anxiety and 12% were experiencing clinical levels of depression. Participant scores on the CFQ ($M=18.8$) were similar to normative samples, however there was variability across the sample with scores ranging from 7 to 40, with higher scores indicating greater fusion. The mean QoL score (39 out of 52) indicates that overall, the sample perceived their QoL to be 'good' or 'excellent', however individual scores ranged more widely from 24 to 50, indicative of greater variability in QoL across the sample.

The number of subjective symptoms reported across the sample was 12, and an average of 7 were attributed to MCI. Participants were more likely to endorse cognitive (e.g. memory and language deficits) rather than somatic symptoms (e.g. cardiovascular or sensory issues). Participants tended to score in the upper range of the scale for the appraisal dimensions of 'timeline' ($M=4.2$, $SD=0.8$) and 'consequences' ($M=3.1$, $SD=0.7$) indicating more strongly held beliefs in the sample that MCI is a chronic condition with greater negative consequences. Participants tended to score in the mid-range on the cyclic subscale ($M=2.4$, $SD=0.9$) suggesting that overall the sample did not strongly perceived their symptoms to be cyclical in nature. Around 51% of the sample reported increased emotionality associated with MCI.

In terms of controllability, the majority of the sample scored in the upper range of the scale suggesting that the overall sample had more positive beliefs about treatments for MCI ($M=3.0$, $SD=0.5$) and perceived themselves to have greater personal control ($M=3.1$, $SD=0.8$) over managing their symptoms. Participant understanding of MCI was varied, with scores ranging from 1 (limited understanding) to 4.9 (high understanding) out of 5.

Correlation analyses

Pearson's correlations were conducted to explore the associations between all study variables, at the group level. Correlation coefficients for study variables are provided in Table 2. The results show a range of moderate correlations in expected directions between objective cognitive impairment and the following three variables: chronic timeline ($r=-.38$, $p<0.05$); personal control ($r=.39$, $p<0.05$); and emotional representations ($r=-.35$, $p<0.05$). Contrary to hypothesis (1), there was no significant relationship found between objective cognitive impairment and depression, anxiety or QoL. Increased depression was significantly associated with a higher number of self-

reported MCI symptoms ($r=.41$, $p<0.05$) and increased perceptions of MCI as a cyclic condition ($r=.48$, $p<0.01$). Increased anxiety was significantly associated with more negative emotional representations of MCI ($r=.52$, $p<0.01$). Reduced QoL was significantly associated with a higher number of self-reported MCI symptoms ($r=-.50$, $p<0.01$) and increased negative appraisals regarding the consequences ($r=.53$, $p<0.01$) and cyclic nature of MCI ($r=-.37$, $p<0.05$). Greater cognitive fusion was significantly associated with increased depression ($r=.36$, $p<0.05$) and anxiety ($r=.67$, $p<0.01$), and reduced QoL ($r=-.48$, $p<0.01$), in addition to a higher number of self-reported MCI symptoms ($r=.41$, $p<0.05$), more negative emotional representations of MCI ($r=.56$, $p<0.01$) and negative appraisals regarding the consequences ($r=.59$, $p<0.01$) and cyclic nature of MCI ($r=.35$, $p<0.05$).

-Insert Table 2 here-

Multivariate analyses: multiple regression

Although the design of this study was cross sectional, variables were categorized a priori as predictor (illness perceptions and cognitive impairment), mediator (cognitive fusion) and outcome variables (depression, anxiety and QoL), in order to test hypotheses about which psychological factors *statistically* 'predict' these important outcomes. Simultaneous forced entry linear regression was conducted to test the relative contribution of cognitive impairment and illness perceptions in predicting anxiety, depression and QoL. As suggested by Broadbent (2006), seven IPQ-MCI subscales were combined to derive an overall 'threat appraisal' variable, with higher scores denoting more negative appraisals of MCI as threatening. The overall threat appraisal variable was entered into the regression model as one, as opposed to seven predictors, in an attempt to conserve power. The composite variable comprised 67 items and the Cronbach's alpha indicated adequate internal consistency ($\alpha=.86$) in the current sample. The variable was normally distributed and had a sample mean of 25.9 ($SD=5.66$, range=16-42). See Table 3 for results of the regression analyses.

Insert Table 3 here-

Prediction of anxiety, depression and quality of life

The two predictors accounted for 19% of the variance in depression symptoms (Adj $R^2=.19$) and the equation was significant ($F_{(2,31)}=4.9$, $p<0.01$). The degree of cognitive impairment did not significantly predict depression, however threat appraisals did with

a moderate to large effect ($\beta=.48$, $p<0.05$). The two predictors accounted for 31% of the variance in QoL (Adj $R^2=.31$, $p<0.01$) and the equation was significant ($F_{(2,31)}=8.3$, $p<0.001$). The degree of cognitive impairment did not significantly predict QoL, however threat appraisals did with a large effect ($\beta=-.58$, $p<0.01$). The two predictors accounted for only 4% of the variance in anxiety symptoms (Adj $R^2=.04$) and the equation was non-significant ($F_{(2,31)}=1.6$, $p>0.05$). There was no significant individual effect of either predictor variable on anxiety.

Conditional process analyses

Linear regression analysis provided information regarding the relative strength of the two predictors on the three psychosocial outcome variables. In order to test more complex relationships between the variables, conditional process analysis was selected (Hayes, 2013). This method allows for detection of indirect effects between the predictor and outcome variables, via a mediating variable. A theoretically informed simple mediation model was hypothesized *a-priori*, which proposed that threat appraisals would influence psychosocial variables (depression, anxiety and QoL) directly, and indirectly via cognitive fusion. The overall threat appraisals model explained 46% of the variance in anxiety. Threat appraisals did not have a significant direct effect on anxiety, however they did have a significant indirect effect when mediated by cognitive fusion ($\beta=.05$, bootstrapped confidence interval (BCI)= .02, .09). The overall cognitive impairment model explained 46% of the variance in anxiety. Cognitive impairment did not have a direct effect on anxiety and was not indirectly mediated by cognitive fusion ($\beta=.02$, BCI=-.02, .06). See Figure 1 outlining the two overall models predicting anxiety.

-Insert Fig 1 here-

The overall threat appraisals model explained 25% of the variance in depression. Threat appraisals did not have a significant direct effect on depression, however they did have a significant indirect effect when mediated by cognitive fusion ($\beta=.01$, BCI=.01, .03). Greater fusion with threat appraisals was associated with increased depression. The overall cognitive impairment model explained 27% of the variance in depression. Cognitive impairment did not have a significant direct effect on depression and was not indirectly mediated by cognitive fusion ($\beta=.014$, BCI=-.008, .044). See Figure 2 outlining the two overall models predicting depression

-Insert Fig 2 -

The overall threat appraisals model explained 39% of the variance in QoL. Threat appraisals had a significant direct effect on QoL ($\beta = -.52$, BCI = $-.900, -.149$), but no significant indirect effect on QoL via cognitive fusion. The overall cognitive impairment model explained 23% of the variance in QoL. Cognitive impairment did not have a significant direct effect on QoL and was not indirectly mediated by cognitive fusion ($\beta = -.20$, BCI = $-.651, .127$). See figure 3 outlines the two overall models predicting QoL.

- Insert Fig 3 -

Discussion

The purpose of the current study was to investigate the inter-relationships between cognitive impairment, illness perceptions, cognitive fusion, distress and QoL, following an MCI diagnosis, at the group level. In line with Leventhal's CSM, results show significant associations, in expected directions, between several types of illness perceptions and psychosocial adjustment outcomes.

Illness perceptions and adjustment to MCI

A higher number of self-reported MCI symptoms were associated with increased distress and lower QoL. Increased negative beliefs regarding the consequences, cyclic nature and emotional impact of MCI were significantly associated with increased distress or poorer QoL in this sample. These results are consistent with previous research demonstrating associations using the Illness Perception Questionnaire (Evans & Norman, 2009; Ferenbach, 2011; Kaptein et al., 2006), and correspond with findings from previous studies with people diagnosed with MCI (Stevenson 2014; Lin & Heidrich, 2012). Although, the current sample had slightly more positive perceptions regarding personal and treatment control compared to Lin et al. (2012) this was not significantly associated with reduce distress or improved QoL. This result could be related to the structure of the IPQ-MCI. Participants can provide a mid-point, neutral answer (*'neither agree nor disagree'*). Previous research indicates that participants are more likely to select these questionnaire options when they lack knowledge on the subject matter (Baka, Figgou & Triga, 2012; Nadler, Weston & Voyles, 2015). Lack of knowledge regarding treatments for MCI and ambiguity surrounding etiology and prognostic trajectory may therefore have resulted in neutral rather positive or negative perceptions for these items (Fang et al., 2017; Gomersall et al., 2015; Karakaya et al., 2013). Moreover, executive functioning difficulties observed in people diagnosed with MCI may result in compromised decision-making capabilities, potentially leading to a higher number of mid-point neutral responses. Although the IPQ-MCI was selected for

use in the current study due to its specificity for people with MCI, it may increase central tendency bias.

There was no significant association in the current sample between severity of memory and thinking problems (as measured by the MoCA) and distress. This is contrary to previous research in populations with cognitive impairment (Biringer et al. 2005; Stillman, Rowe, Arndt & Moser 2012; Spitz, Schönberger & Ponsford, 2013). While this was unexpected, other research in populations with neurological conditions (Ferenbach, 2011; Spain et al. 2007) has also found no significant impact of disease severity on emotional adjustment outcomes. These results might be explained by the limited scope of the MoCA, as it is a short cognitive screening tool, rather than a detailed measure of participant cognitive functioning.

Our results suggest that appraisals of MCI explain significantly greater variance in depression and QoL than objective cognitive impairment. This is consistent with research in other health populations (Groarke et al., 2004; Severeijns et al., 2001; Spain et al., 2007). The results therefore suggest that participants' beliefs about MCI have greater bearing on mood and life satisfaction following diagnosis than the objectively measured severity of their memory and thinking problems. Neither cognitive impairment nor threat appraisals significantly predicted anxiety. This finding was unexpected, but supported our hypotheses that an additional variable (i.e. cognitive fusion) may have a mediating role in determining adjustment outcomes in this population.

Despite the objective cognitive assessment not being strongly associated with emotional distress outcomes, it was clear that subjective appraisals of cognitive complaints (particularly number of cognitive symptoms and the degree to which these are subjectively appraised as threatening), were moderately to strongly associated with emotional distress and quality of life. Participants' appraisal of having little control over their condition might also relate to their internal or external Locus of Control (Rotter, 1966). This is supported by the finding of a strong *negative* correlation between appraisals of personal control and treatment control. Locus of Control is a well-established psychological construct that states that how a person perceives the relationship between his or her behaviour and outcomes (such as health status, wellbeing, distress and quality of life), will influence a range of other behaviours, including help seeking, self-monitoring, goal setting and behavioural regulation. From this perspective, it can be hypothesised that participants who experience little sense

of control over their MCI may also develop an external locus of control. A person with MCI who has an external locus of control may be less likely to engage in self-support efforts such as using memory aids, planning, self-regulation of sleep, and structuring daily activity. They may also correspondingly seek answers externally, presenting to health professionals, depending more heavily on others, seeking pharmacological interventions or folk remedies.

Strengths and limitations

A clear limitation of the study is the low sample size and power. As multiple comparisons have been computed with a small sample this also increases the chance of type 1 error. Several factors contributed to low recruitment: clinician referral, including time pressures during memory clinic appointments; variation in diagnostic practices; and lack of ongoing clinical contact with patients in the three to nine months post diagnosis. The opt-in recruitment method may have reduced overall participation in the study. Although this recruitment method was a condition of ethical approval, it may have placed greater demand on the cognitive capabilities of the sample, and may have potentially influenced the sample as people who may have held more neutral appraisals of MCI may not have felt motivated to take part. A strength of the study is that it measured adjustment variables within a specific three to nine month time frame post diagnosis. Relationships between appraisals, fusion, distress and QoL are likely to be relatively less stable during this first three months post diagnosis. The decision to exclude these participants from the current study was made in order to get a more stable estimate of the associations between constructs, given the cross sectional and self-report methodology used. This is a period of time that requires closer research attention in future studies, using longitudinal and experience sampling methodologies to track the adjustment process (or disruption to it) over time. Furthermore, the nine-month boundary and the inclusion of a cognitive screening measure (MoCA) most likely minimised the inclusion of participants who had experienced either remittance of cognitive problems or further cognitive decline.

Future directions and Clinical implications

Future research could include analysing individual differences with a multiple-baseline single case study design (Blampied, 1999) with a visual and statistical analysis for this design (Parker et al., 2012) to understand the individual as opposed to group magnitude of illness perception change following ACT intervention. Although the current study shows a pattern of relationships at the group level, the work is not yet sufficiently developed to provide cut-off scores for identifying individuals whose

appraisals or cognitive fusion put them at greater risk of poor adjustment. The findings do suggest that future research to identify such cut offs, using the same validated measures could be worth pursuing.

In the clinical context, there are no current published guidelines regarding provision of post-diagnostic support for people receiving an MCI diagnosis. It is likely that memory clinic service provision will vary by location and resourcing capacity. One potential avenue for improving post-diagnostic support could be to have a routine review appointment after three - six months to assess adjustment/emotional distress and have a clinical pathway for referral to psychological therapy. In the first instance, developing guidelines regarding how diagnosis is discussed, providing appropriate literature to people diagnosed with MCI would be an important recommendation. Secondly, developing and providing self-help or guided self-help materials for cognitive and/or emotional adjustment strategies may reduce the need for a more intensive psychological intervention.

Threatening appraisals of MCI significantly predicted depression and QoL in the current sample. Cognitive modification treatments, such as CBT, may hold potential to improve mood and life satisfaction in people diagnosed with MCI by attempting to directly change maladaptive beliefs about the condition. In particular, the current study suggests that negative beliefs about the consequences (e.g. 'MCI will progress to dementia') or cyclic nature (e.g. 'MCI is very unpredictable') of MCI should be targeted. ACT, which directly targets cognitive fusion, may also offer potential to reduce distress in people diagnosed with MCI. ACT may be more fitting for MCI diagnosis, as it would aim to change the function rather than the form of threatening illness perceptions. This approach may be preferable to direct cognitive-change techniques synonymous with Cognitive Therapy, as patient perceptions about their condition could be realistic (e.g. 'MCI strongly affects the way others see or treat me'). Rather than attempting to directly modify perceptions, ACT would attempt to reduce the regulatory effect perceptions were having on patient behaviour (e.g. social avoidance).

Hypotheses described above, related to control appraisals and their impact on behaviours intended to deal effectively with MCI could also be tested in future studies. Control appraisals could be a treatment target from within a cognitive behavioural perspective. Behavioural experiments designed to test out predictions of external versus internal control could lead to alterations in such appraisals, and the development of greater internal control appraisal and motivation to engage in adaptive self-regulation strategies. Alternatively, the findings of this study also suggest that

helping people to step back from such appraisals, using ‘defusion’ strategies from Acceptance and Commitment Therapy, could be an alternative route to enhancing wellbeing and reducing distress for people with MCI.

ACT is fundamentally a behavioural therapy. It teaches people to make room for their difficult symptoms, and the thoughts and emotions that accompany these, in order to facilitate effective behaviour. Importantly, it teaches people to live in the here and now, rather than mentally time travelling to a feared future, or being hooked into past memories. In the context of developing ACT for MCI, this could involve teaching mindfulness skills to be grounded in the here and now. In addition, defusion skills would be used to step back from worries around future progression to dementia, as well as step back from ruminations on the impact of MCI on the person’s sense of self. ACT for MCI would also spend time connecting with the person’s values, clarifying what matters for them now that they have this diagnosis. Time would also be spent translating those values into specific actions, and structuring activities to support these actions, despite internal or external barriers, would also be a feature. Within these ‘committed action’ elements of ACT could also be actions that are designed to live effectively with, and also reduce the impact of MCI. For example, engaging in planning, daily structure, effective communication of wants and needs, use of memory supports and technology to assist living with MCI, could all be considered to be actions that could help people to live effectively with an MCI diagnosis.

ACT-based interventions for other neurological conditions have shown initial promise (e.g. Sheppard, Forsyth, Hickling & Bianchi, 2010; Nordin & Rorsman, 2012; Gillanders & Gillanders, 2014b; Graham, Gillanders, Stuart & Gouick, 2015; Whiting, Deane, & McLeod, 2017) suggesting that ACT could be successfully adapted for people diagnosed with MCI. The availability of well-trained ACT practitioners is a significant barrier to making such interventions available in routine practice settings where MCI is diagnosed, however. Fortunately, there is good evidence that ACT can be used as an overarching framework to support and inform the work of multidisciplinary teams in complex healthcare settings (e.g. Gauntlett-Gilbert, 2011). ACT can be used to organize the work of teams, and different professionals within a team can be trained to deliver elements of ACT work at different levels.

Conclusion

The current study demonstrates additional support for the role of illness perceptions in psychosocial adjustment to MCI. Results indicate that cognitive fusion, a construct central to ACT, may play an additional role in influencing adjustment outcomes. Our findings suggest that illness perceptions could be modified, from within a theoretically consistent ACT-model, to improve QoL amongst patients adjusting to MCI. Findings provide an understanding concerning the factors involved in patients' adjustment to MCI and assist with development of assessment and early intervention procedures for patients with increased distress or reduced life satisfaction following diagnosis.

Table1: Descriptive statistics for the study sample

Characteristic	Mean (SD)
Age	76.4 (7.8)
Education (years)	14.3 (3.7)
MoCA score	21.9 (3.1)
Months since MCI diagnosis	5.3 (2.1)
	N
Female	16
Male	18
Retired	28
Marital status	
Married	23 (67.6)
Divorced	1 (2.9)
Single	3 (8.8)
Widowed	7 (20.6)
Onset of cognitive problems (years)	
<1	4 (11.8)
1 - 3	13 (38.8)
3 - 5	11 (32.3)
5+	6 (17.6)

MoCA: Montreal Cognitive Assessment (Nasreddine *et al.*, 2005); SD= standard deviation

Table 2: Correlation matrix between independent, mediator and outcome variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. MoCA	1	-.10	.24	-.15	.20	.14	-.38*	.09	.39*	-.25	.07	.24	.35*
2. GDS-5		1	.35	-.51**	.36*	.41*	-.23	.32	-.26	.10	.48**	-.18	.13
3. GAI-SF			1	-.32	.67**	.20	-.18	.33	.29	-.38	.21	.03	.52**
4. QoL-AD				1	-.48**	-.50**	.31	-.53**	.29	.03	-.37*	.30	-.11
5. CFQ					1	.41*	-.29	.59**	.12	-.16	.35*	-.17	.56**
6. Identity						1	-.27	.69**	.18	-.18	.50**	-.32	.26
7. Chronic timeline							1	-.46**	-.03	-.17	-.26	.10	-.27
8. Consequences								1	.13	-.04	.39*	-.32	.44**
9. Personal control									1	-.41*	-.03	.15	.29
10. Treatment control										1	-.24	-.14	-.24
11. Cyclic											1	-.35*	.28
12. Coherence												1	-.25
13. Emotional representations													1

Note: * = Correlation is significant at the 0.05 level (2-tailed) ** = Correlation is significant at the 0.01 level (2-tailed)

Table 3: Linear regression for prediction of depression, anxiety and quality of life

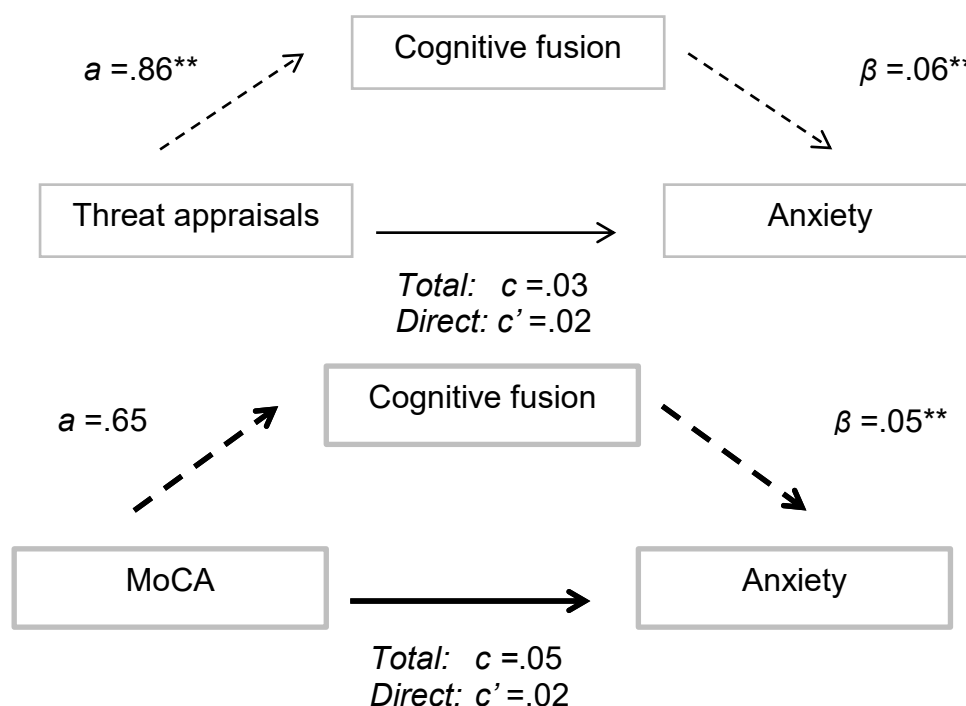
	GAI-SF: Anxiety			GDS-5: Depression			QoL-AD: Quality of life		
Variable	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Cognitive impairment	.03	.03	.21	-.09	.02	-.15	-.19	.31	-.09
Threat appraisal	.02	.02	.21	.03	.01	.48*	-.65	.17	-.58**
<i>R</i> ²	.09			.24			.35		
<i>Adj. R</i> ²	.04			.19			.31		
<i>F</i>	1.6			4.9			8.3		
<i>P-value</i>	<i>p</i> =.22			<i>p</i> =.01**			<i>p</i> =.001***		

Note:

* =significant at <0.05 level; **=significant at <0.01 level; ***=significant at <0.001 level

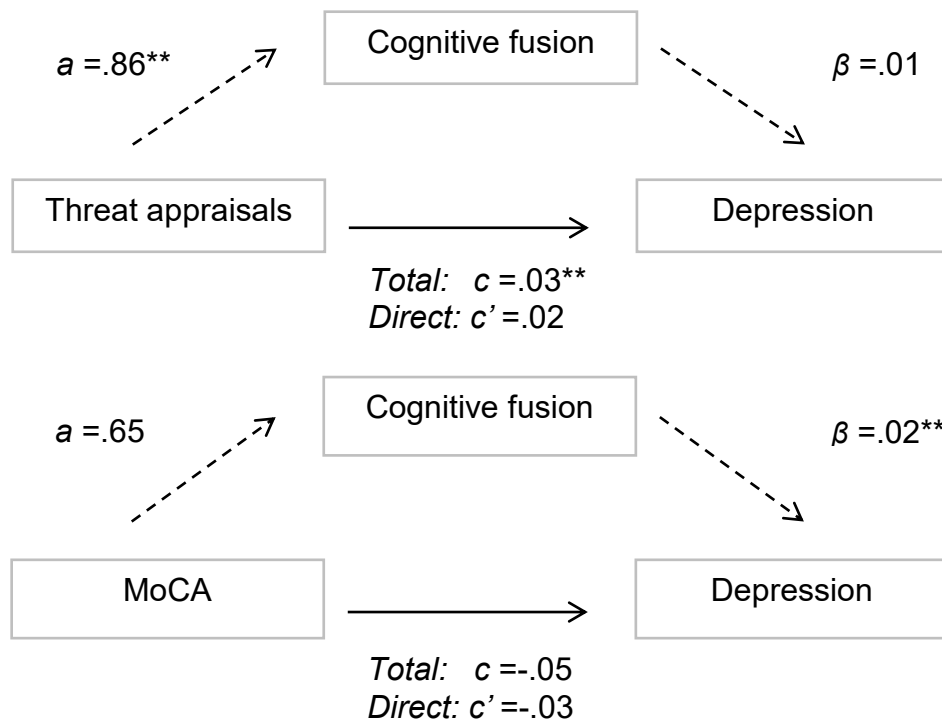
GAI-SF: Geriatric Anxiety Inventory – Short Form; **GDS-5:** Geriatric Depression Scale – five item; **QoL-AD:** Quality of Life in Alzheimer’s Disease.

Figure 1: Conditional process analysis – anxiety models



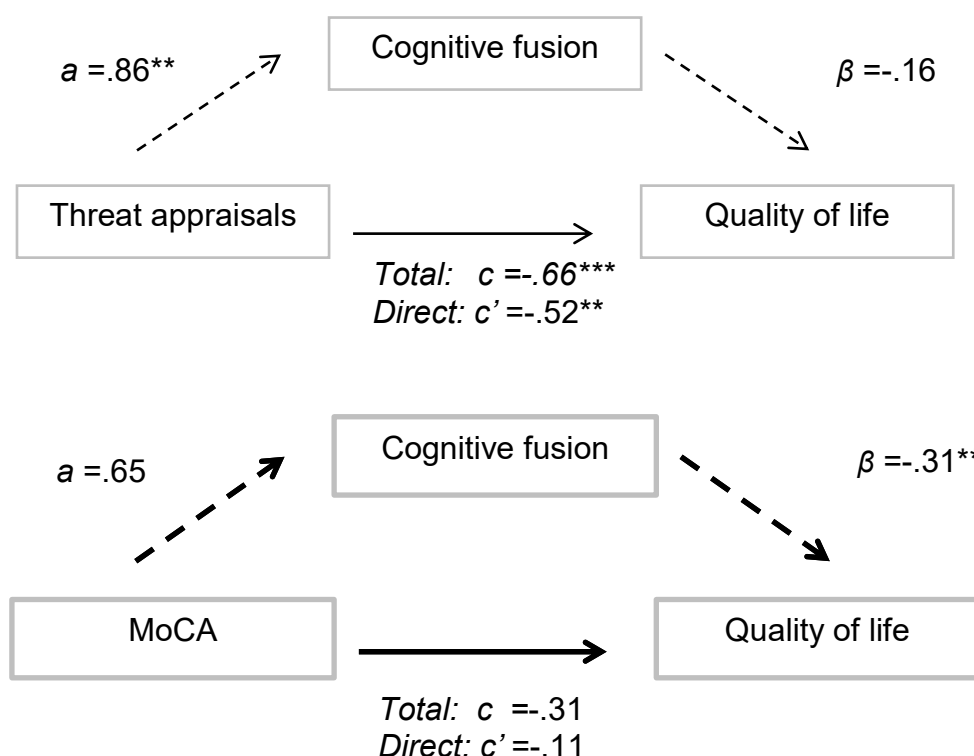
	BCI	
Path – anxiety	LL	UL
Total effect (Threat appraisals to anxiety)	-.02	.08
Direct effect (Threat appraisals to anxiety)	-.07	.02
Total indirect effect (Threat appraisals to cognitive fusion to anxiety)	.02	.09
Total model	$R^2=.46$, $p<.0001$, $f^2=13.41$	
Total effect (MoCA to anxiety)	-.04	.14
Direct effect (MoCA to anxiety)	-.06	.09
Total Indirect effect (MoCA to cognitive fusion to anxiety)	-.03	.06
Total model	$R^2=.46$, $p<.0001$, $f^2=13.08$	

Figure 2: Conditional process analysis – depression models



	BCI	
Path – depression	LL	UL
Total effect (Threat appraisals to depression)	.01	.05
Direct effect (Threat appraisals to depression)	-.003	.05
Total indirect effect (Threat appraisals to cognitive fusion to depression)	.01	.03
Total model	$R^2=.25, p<.01, f^2=6.64$	
Total effect (MoCA to depression)	-.06	.03
Direct effect (MoCA to depression)	-.07	.01
Total Indirect effect (MoCA to cognitive fusion to depression)	-.01	.05
Total model	$R^2=.27, p<.01, f^2=5.75$	

Figure 3: Conditional process analysis – quality of life models



	BCI	
Path – quality of life (QoL)	LL	UL
Total effect (Threat appraisals to QoL)	-.99	-.33
Direct effect (Threat appraisals to QoL)	-.90	-.15
Total indirect effect (Threat appraisals to cognitive fusion to QoL)	-.32	.06
Total model	$R^2 = .39$, $p < .001$, $f^2 = 9.80$	
Total effect (MoCA to QoL)	-1.1	.45
Direct effect (MoCA to QoL)	-.80	.59
Total Indirect effect (MoCA to cognitive fusion to QoL)	-.64	.15
Total model	$R^2 = .23$, $p < .05$, $f^2 = 4.61$	

Note: Numbers on the path indicate unstandardised β coefficients.

BCI: bootstrapped confidence interval; LL: Lower limit; UL: Upper limit

*=significant at <0.05 level; **=significant at <0.01 level; ***=significant at <0.001 level

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